



Report on the FY 05 Mining Portfolio Peer Review

Overview of the Portfolio

The Mining portfolio of the Industrial Technologies Program (ITP), an initiative of the United States Department of Energy Office of Energy Efficiency and Renewable Energy (DOE-EERE), supports cost-shared competitive research projects that focus on reducing the mining industry's energy consumption. The Mining portfolio plans to reach its goal by funding projects that are high risk for industry investment but will lead to large energy savings for the industry. The portfolio evolves over time as research and development (R&D) projects are funded and completed, as new opportunities with significant impact on the industry's energy use are identified, and as national priorities change.

The Mining portfolio is structured to target three areas in the mining process that offer the greatest opportunity for energy savings: (1) Extraction, (2) Materials Handling, and (3) Beneficiation and Processing. Each of these focus areas support ITP's mission to reduce the energy intensity of industry while enhancing productivity and economic growth. The *Extraction* area focuses on the development of more energy-efficient exploration and extraction technologies. These developments will improve product recovery efficiencies in the extraction of valuable material, thus reducing the amount of unwanted material that must be handled (transported) and processed downstream. *Materials Handling* focuses on the development of energy-efficient alternative methods to reduce the dependence on diesel equipment for material transportation. *Beneficiation and Processing* includes the development of technologies that will reduce the energy intensity of processing activities such as grinding and separations of mined materials.

Portfolio Management

R&D projects for the Mining portfolio are selected through open, competitive solicitations. The solicitation areas are established using the ITP Strategic Plan, Multi-Year Plan, analytical studies, industry inputs, and the gaps and priorities identified during program and portfolio reviews. Solicitations are designed to attract cost-shared collaborative project proposals that have the potential to increase energy efficiency and reduce environmental impact. A team of industry experts evaluate the submitted proposals based on the technical evaluation criteria specified in the solicitation. The selection official evaluates the recommended proposals based on the program policy factors identified in the solicitation and selects the projects that will best support ITP's goals and objectives. The National Energy Technology Laboratory (NETL) contracting and project management team negotiates and awards each of the selected projects, monitors cost and technical progress, reviews quarterly cost and progress reports, performs site visits, and modifies the awards as needed. Active R&D projects in the Mining portfolio are evaluated in an annual Portfolio Peer Review.

Purpose of the Portfolio Peer Review

The 2005 ITP Mining Portfolio Review evaluated the portfolio's R&D projects from both technical and industrial aspects by technical reviewers with varied expertise. The 2005 Portfolio Review was designed to

- create awareness among the audience about the ongoing research in the Mining portfolio and its impact on industry,
- provide opportunity for networking between the principal investigators and potential research or commercialization partners,

- evaluate performance of each project in depth to provide R&D teams with constructive feedback on their projects and to help guide project management decisions of DOE, and
- provide a "big-picture" of the overall Mining portfolio and generate feedback on the overall balance and performance of the portfolio to help guide future DOE solicitations.

The Portfolio Peer Review Process

The Mining portfolio held its 2005 Portfolio Review during the 2005 SME Annual Meeting and Exhibit in Salt Lake City, Utah. This was the first Mining portfolio review conducted at an SME annual conference, which proved to be an excellent meeting location; the SME conference provided a common forum for the projects' principal investigators (PI), DOE staff, national lab personnel, as well as the industry experts and other emerging leaders in the mining industry to come together and provide their feedback on the Mining portfolio. The review sessions had 30-70 attendees at any given time. All 14 active projects in the current program portfolio were assessed by selected technical reviewers, with each project being evaluated by a minimum of three to a maximum of six reviewers. The portfolio review was conducted during a morning and an afternoon session, both based on a similar format. Each project was presented by the respective principal investigator or a teammate for 15 or 30 minutes. A five-minute Q&A session followed each presentation. The designated reviewers then assessed the project by inputting their response into the project questionnaire form.

Portfolio Review Panel

A diverse group of mining industry experts was required to evaluate the projects since the projects covered varied mining methods and focus areas. Candidates were nominated from industry, national labs, and academia that had extensive knowledge and professional experience in different areas of the mining industry.

The portfolio reviewers were provided with a pre-review package that included project fact sheets, project summary forms submitted by the PIs, energy metric calculations, project milestones, and review forms; this allowed the reviewers to examine the project goal, description, and the technical progress data in detail prior to the project's review. In addition, the reviewers could formulate their questions regarding the project based on the packet's contents. This enabled the reviewers to be well informed and prepared prior to the review session, ensuring an accurate and fair evaluation process.

Project Review Criteria

All projects were evaluated based on 11 criteria. The project evaluation required reviewers to respond to a question relating to each of these criteria:

1. *Project Objective*: How significant will the results be to the industry?
2. *Project Innovation*: Will this project develop any innovation in the mining industry?
3. *Energy Savings Potential*: Will this project save energy in the mining industry?
4. *Additional Environmental Benefits*: Are there any additional benefits that relate to the environment?
5. *Technical Barriers*: Does the project address any technical problems and barriers limiting industrial energy savings?
6. *Critical Technical Metrics and Project Milestones*: How relevant are the technical milestones being addressed in this project? How effective is the approach in addressing

- the technical decision points of this project? What are your recommendations on how to improve the technical approach?
7. *Project Pathway*: Was the project pathway emphasized and defined during the presentation?
 8. *Progress/Accomplishments/Problems*: How important are results of this work in the advancement of the program objective?
 9. *Future Plans*: Do the future plans and milestones build on the past work and ensure the success of the project?
 10. *Project Changes*: Does the project require redirection?
 11. *Commercialization Readiness*: Will the commercialization path described promote this project into the marketplace?

The Portfolio Peer Review Results

Project evaluations were conducted on 14 active projects (listed in Exhibit 1) in the FY05 review.

Exhibit 1: Mining Projects that Participated in the FY 05 Review

Extraction Projects

- Mine-to-Mill Optimization of Aggregate Production (*Virginia Polytechnic Inst. and State University*)
- Crosswell Imaging Technology & Advanced DSR Navigation for Horizontal Directional Drilling (*Stolar Research Corporation*)
- Development of New Geophysical Technique for Mineral Exploration and Mineral Discrimination Based on Electromagnetic (*University of Utah*)
- Methods Investigation of GPS/IMU Positioning System for Mining Equipment (*Caterpillar*)
- Integrated Robot-Human Control in Mining Operations (*University of Nevada – Reno*)

Materials Handling Projects

- Effective Conveyor Belt Inspection for Improving Mining Productivity (*Carnegie Mellon University*)

Beneficiation and Processing Projects

- Smart Screen Systems for Taconite Processing (*QRDC*)
- Determination of Acid Resistance of Agglomerates in Copper Heap-Leaching (*Michigan Tech. University*)
- Commercial Demonstration of the GranuFlow™ Process for Improved Fine Coal Recovery (*CQ Inc*)
- Online SAG Mill Grinding Pulse Measurement and Optimization (*University of Utah*)
- Development of High-Efficiency Hydraulic Separators (*Virginia Polytechnic Inst. and State University*)
- Improving Energy Efficiency via Optimized Charge Motion and Slurry Flow in Plant-Scale SAG Mills (*University of Utah*)
- Full-Scale Mine/Mill Tests of Iron Ore Hardness versus Millability (*University of Missouri-Rolla*)
- Development of Advanced Surface Enhancement Technology for Decreasing Wear and Corrosion of Equipment Used for Mineral Processing (*University of Kentucky*)

All project evaluation reports were prepared by DOE using inputs from the peer reviewers. DOE then sent each project evaluation report to its respective PI. Among the 14 projects reviewed, 5 have been fully funded and scheduled for completion in FY 2005. One of the more frequent comments by reviewers was questionable assumptions and estimates for energy benefits. DOE has contacted the PIs and discussed the energy benefits for those projects where estimates and assumptions were questioned.

Program and Project Management Response

The majority of the review recommendations relate to individual project management activities. ITP will use the results of the peer review to help improve and refine the Mining portfolio and program strategy. ITP will consider the reviewers' feedback as it assesses its portfolio, and program priorities and opportunities. ITP has identified many opportunities for saving energy in the mining industry. The program will analyze these opportunities in more detail in FY 06 to sharpen its strategy and potentially, restructure its portfolio to better target the top priorities.

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is clean, abundant, reliable, and affordable